

WHAT IS CLAIMED IS:

1 1. A radio frequency (RF) demodulation circuit comprising:
2 a radio frequency (RF) mixer having a first input port
3 capable of receiving an incoming RF signal having a frequency of RF
4 and a second input port capable of receiving a first local
5 oscillator (LO) signal having a frequency of LO, wherein said RF
6 mixer generates a first intermediate frequency (IF) signal having a
7 frequency of IF;

8 a frequency divider circuit capable of receiving said
9 first LO signal having said frequency of LO and generating
10 therefrom a second local oscillator (LO) signal having a frequency
11 of LO/N and synchronized with said first LO signal; and

12 an intermediate frequency (IF) mixer having a first input
13 port capable of receiving said first IF signal and a second input
14 port capable of receiving said second LO signal having said
15 frequency of LO/N, and wherein said IF mixer generates a baseband
16 output signal.

1 2. The radio frequency demodulation circuit as set forth in
2 Claim 1 wherein N is an integer.

1 3. The radio frequency demodulation circuit as set forth in
2 Claim 1 wherein N is an even integer.

1 4. The radio frequency demodulation circuit as set forth in
2 Claim 1 wherein N is 4.

1 5. The radio frequency demodulation circuit as set forth in
2 Claim 1 wherein a) N is an even integer, b) $RF = LO + IF$, and
3 c) $LO = IF(N)$.

1 6. A radio frequency (RF) receiver comprising:
2 a receiver front-end circuit capable of receiving an
3 incoming RF signal from an antenna and filtering and amplifying
4 said incoming RF signal; and
5 a radio frequency (RF) demodulation circuit coupled to
6 said receiver front-end circuit comprising:
7 a radio frequency (RF) mixer having a first input
8 port capable of receiving said amplified RF signal having a
9 frequency of RF and a second input port capable of receiving a
10 first local oscillator (LO) signal having a frequency of LO,
11 wherein said RF mixer generates a first intermediate frequency
12 (IF) signal having a frequency of IF;
13 a frequency divider circuit capable of receiving
14 said first LO signal having said frequency of LO and
15 generating therefrom a second local oscillator (LO) signal
16 having a frequency of LO/N and synchronized with said first LO
17 signal; and
18 an intermediate frequency (IF) mixer having a first
19 input port capable of receiving said first IF signal and a
20 second input port capable of receiving said second LO signal
21 having said frequency of LO/N, and wherein said IF mixer
22 generates a baseband output signal.

1 7. The radio frequency receiver as set forth in Claim 6
2 wherein N is an integer.

1 8. The radio frequency receiver as set forth in Claim 6
2 wherein N is an even integer.

1 9. The radio frequency receiver as set forth in Claim 6
2 wherein N is 4.

1 10. The radio frequency receiver as set forth in Claim 6
2 wherein a) N is an even integer, b) $RF = LO + IF$, and
3 c) $LO = IF(N)$.

1 11. A method of demodulating an incoming radio frequency (RF)
2 signal having a frequency of RF comprising the steps of:

3 mixing in an RF mixer the incoming RF signal with a first
4 local oscillator (LO) signal having a frequency of LO to thereby
5 generate an intermediate frequency (IF) signal having a frequency
6 of IF;

7 dividing the first LO signal having the frequency of LO
8 and generating therefrom a second local oscillator (LO) signal
9 having a frequency of LO/N and synchronized with the first LO
10 signal; and

11 mixing in an intermediate frequency (IF) mixer the IF
12 signal and the second LO signal having the frequency of LO/N to
13 thereby generate a baseband output signal.

1 12. The method as set forth in Claim 11 wherein N is an
2 integer.

1 13. The method as set forth in Claim 11 wherein N is an even
2 integer.

1 14. The method as set forth in Claim 11 wherein N is 4.

- 1 15. The method as set forth in Claim 11 wherein a) N is an
2 even integer, b) $RF = LO + IF$, and c) $LO = IF(N)$.

1 16. A radio frequency (RF) demodulation circuit comprising:
2 a radio frequency (RF) mixer having a first input port
3 capable of receiving an RF signal having a frequency of RF and a
4 second input port capable of receiving a first local oscillator
5 (LO) signal having a frequency of LO, wherein said RF mixer
6 generates a first intermediate frequency (IF) signal having a
7 frequency of IF;
8 a frequency divider circuit capable of receiving said
9 first LO signal and generating therefrom an in-phase local
10 oscillator (LO) signal having a frequency of LO/N and synchronized
11 with said first LO signal and a quadrature local oscillator (LO)
12 signal having a frequency of LO/N and synchronized with said first
13 LO signal;
14 a first IF mixer having a first input port capable of
15 receiving said first IF signal and a second input port capable of
16 receiving said in-phase LO signal, wherein said first IF mixer
17 generates an in-phase baseband output signal; and
18 a second IF mixer having a first input port capable of
19 receiving said first IF signal and a second input port capable of
20 receiving said quadrature LO signal, wherein said second IF mixer
21 generates a quadrature baseband output signal.

1 17. The radio frequency demodulation circuit as set forth in
2 Claim 16 wherein N is an integer.

1 18. The radio frequency demodulation circuit as set forth in
2 Claim 16 wherein N is an even integer.

1 19. The radio frequency demodulation circuit as set forth in
2 Claim 16 wherein N is 4.

1 20. The radio frequency demodulation circuit as set forth in
2 Claim 16 wherein a) N is an even integer, b) $RF = LO + IF$, and
3 c) $LO = IF(N)$.

21. A radio frequency (RF) receiver comprising:

a receiver front-end circuit capable of receiving an incoming RF signal from an antenna and filtering and amplifying said incoming RF signal; and

a radio frequency (RF) demodulation circuit coupled to said receiver front-end circuit comprising:

a radio frequency (RF) mixer having a first input port capable of receiving said amplified incoming RF signal having a frequency of RF and a second input port capable of receiving a first local oscillator (LO) signal having a frequency of LO, wherein said RF mixer generates a first intermediate frequency (IF) signal having a frequency of IF;

a frequency divider circuit capable of receiving said first LO signal and generating therefrom an in-phase local oscillator (LO) signal having a frequency of LO/N and synchronized with said first LO signal and a quadrature local oscillator (LO) signal having a frequency of LO/N and synchronized with said first LO signal;

a first IF mixer having a first input port capable of receiving said first IF signal and a second input port capable of receiving said in-phase LO signal, wherein said first IF mixer generates an in-phase baseband output signal;

23 and

24 a second IF mixer having a first input port capable
25 of receiving said first IF signal and a second input port
26 capable of receiving said quadrature LO signal, wherein said
27 second IF mixer generates a quadrature baseband output signal.

1 22. The radio frequency receiver as set forth in Claim 21
2 wherein N is an integer.

1 23. The radio frequency receiver as set forth in Claim 21
2 wherein N is an even integer.

1 24. The radio frequency receiver as set forth in Claim 21
2 wherein N is 4.

1 25. The radio frequency receiver as set forth in Claim 21
2 wherein a) N is an even integer, b) $RF = LO + IF$, and
3 c) $LO = IF(N)$.

26. A method of demodulating an incoming radio frequency (RF) signal having a frequency of RF comprising the steps of:

mixing in an RF mixer the incoming RF signal with a first local oscillator (LO) signal having a frequency of LO to thereby generate an intermediate frequency (IF) signal having a frequency of IF;

dividing the first LO signal having the frequency of LO and generating therefrom an in-phase local oscillator (LO) signal having a frequency of LO/N and synchronized with the first LO signal and a quadrature local oscillator (LO) signal having a frequency of LO/N and synchronized with the first LO signal;

mixing in a first intermediate frequency (IF) mixer the IF signal and the in-phase LO signal to thereby generate an in-phase baseband output signal; and

mixing in a second intermediate frequency (IF) mixer the IF signal and the quadrature LO signal to thereby generate a quadrature baseband output signal.